EEL 6935: ADVANCED SPEECH PROCESSING

SPRING 2005

Prerequisite: EEL6586 Automatic Speech Processing
Class Meeting: MWF 5th period (11:45-12:35pm) in LAR 239
Class Homepage: http://www.cnel.ufl.edu/hybrid/courses/EEL6935

Course Description: Conventional speech processing systems (such as hearing aids and automatic speech recognition systems) have well known difficulties operating in noisy, uncertain environments. Since humans excel in these auditory environments, it is prudent to understand exactly why the human auditory system works so well. By studying the human auditory system, we hope to build biologically inspired speech processing systems that can outperform today's conventional approaches. This research course discusses advanced topics in speech processing including:

* Limitations of conventional approaches
* Biologically plausible preprocessing (cochlea/hair cell models)
* Spike-based signal representations
* Pitch extraction
* Auditory localization
* Information coding in the auditory nerve
* Physiological representations of speech
* Biologically plausible recognition systems
* Hearing impairments

We will also consider the impact of these biologically-inspired ideas on several important applications including:

* Hearing aids and cochlea implants
* Spike-based speech coding
* Biologically inspired speech recognition systems
* Real-time speech enhancement
* Automatic quantification of accented and otherwise disordered speech

Students will be required to complete homework assignments that include Matlab-based simulations of biologically inspired processing on recorded speech signals. Each student will also complete a final project on a course related topic of their choosing.

Required Textbook:
Speech Processing in the Auditory System by Steven Greenberg, Arthur N. Popper, William A. Ainsworth, Richard R. Fay, William Ainsworth, Publisher: Springer-Verlag, 2004 ISBN: 0387005900.

Reference Books:
- Integrative Functions in the Mammalian Auditory Pathway (Handbook in Auditory Research) by Donata Oertel, Richard R. Fay, Arthur N. Popper, Publisher: Springer-Verlag; 2002, ISBN: 038798903X

- Spoken Language Processing: A Guide to Theory, Algorithm and System Development by Xuedong Huang, Alex Acero, Hsiao-Wuen Hon, Raj Reddy, 2001 Prentice Hall PTR; ISBN: 0130226165

Tentative Grade Determination:

1/3 Homework

1/3 Exams

1/3 Final Project

Honesty Policy: "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity." On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment."

Special Accommodations: Students requesting classroom accommodation must first register with the Dean of Students Office. This Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

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